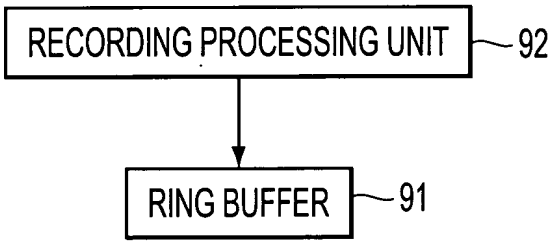


FIG. 1

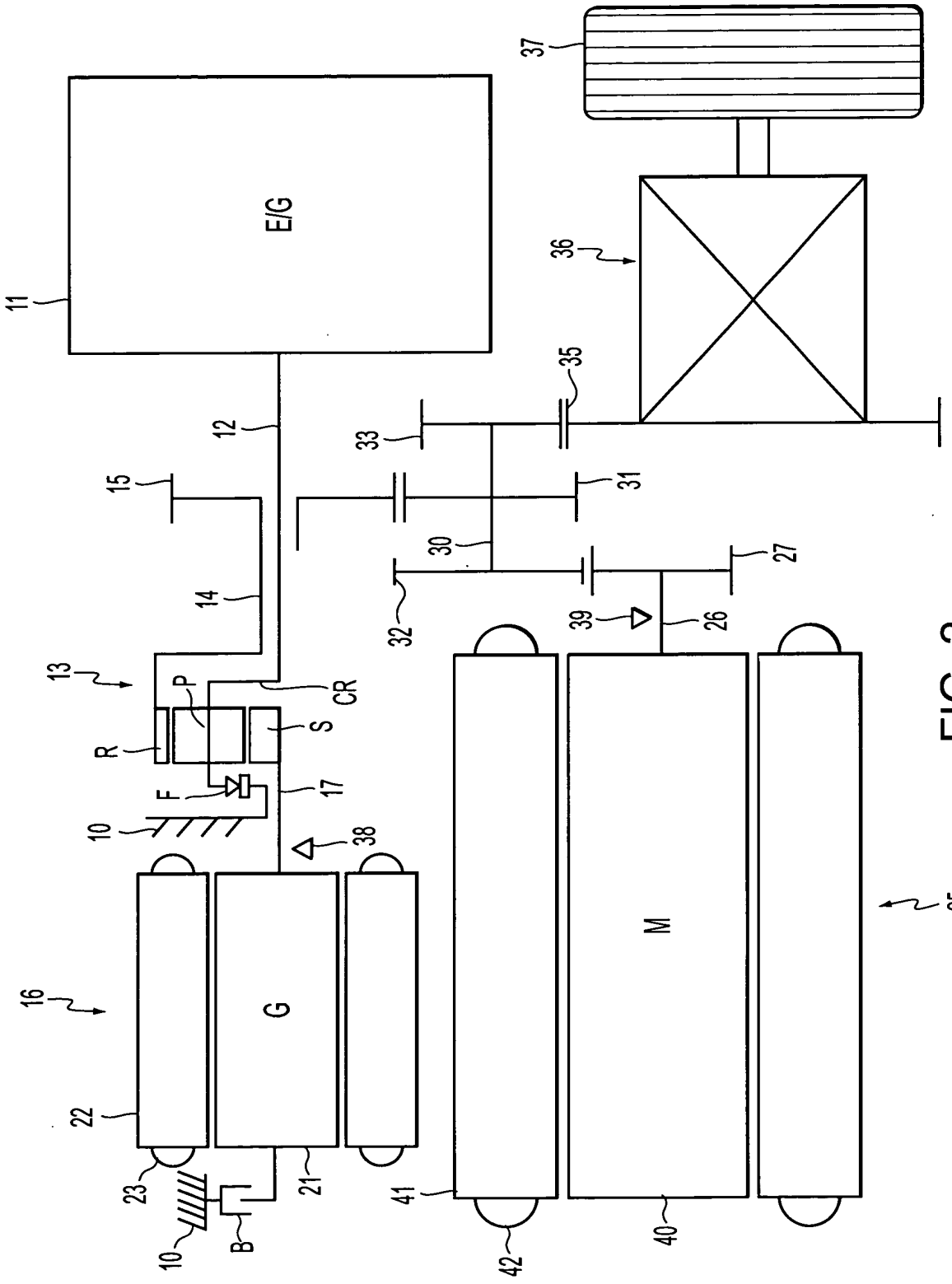

E/G
11
12
13
14
15
16
17
22
23
21
10
B
G
P
R
S
CR
F
38
41
42
M
40
25
26
27
39
32
30
31
33
35
36
37

FIG. 2

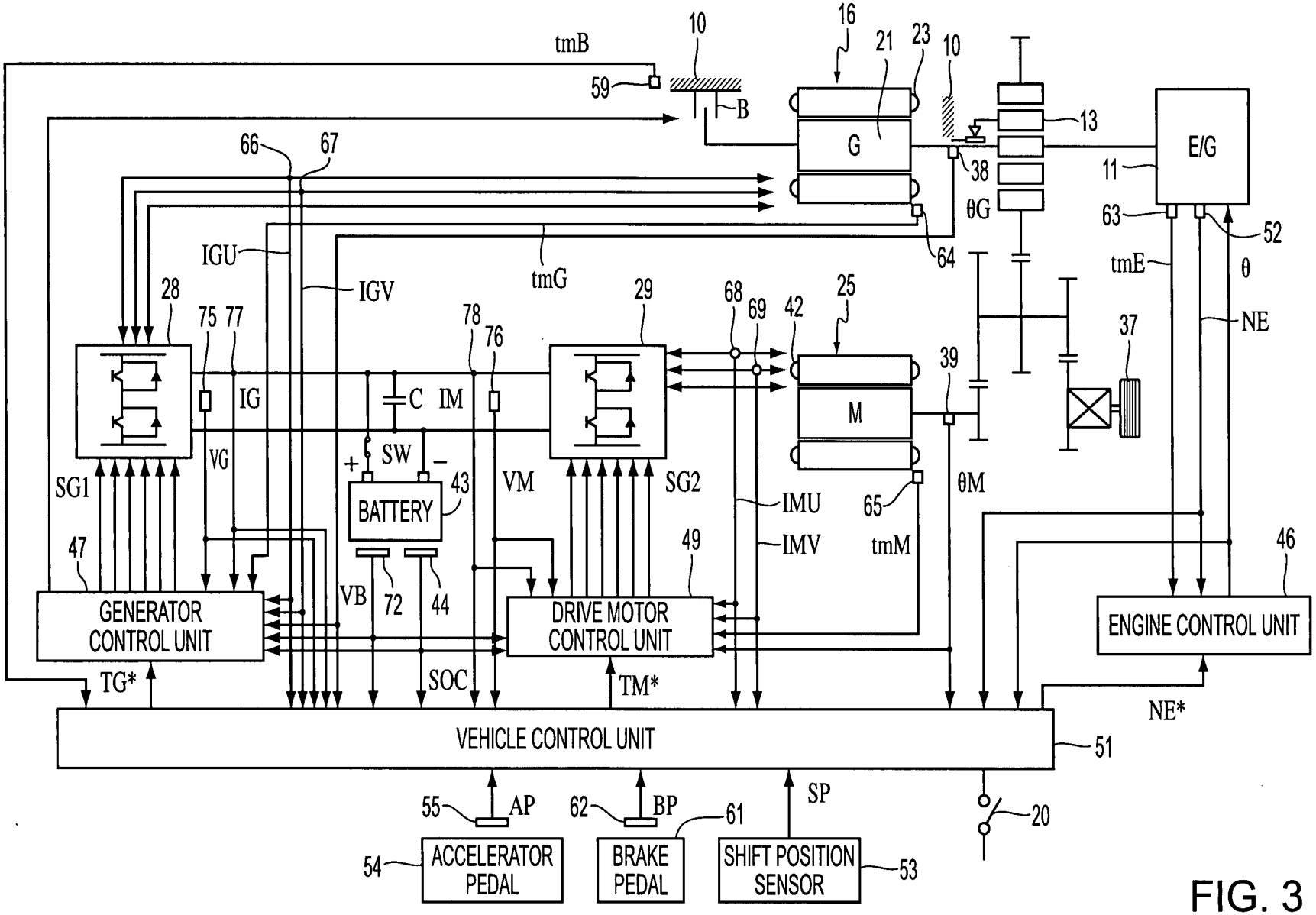

tmB
10
59
B
16
21
23
10
G
13
E/G
11
66
67
38
θG
63
52
IGU
IGV
tmG
64
tmE
θ
28
75
77
78
76
29
68
69
42
25
37
NE
IG
C
IM
M
39
SG1
VG
SW
+
−
43
VM
SG2
IMU
65
θM
BATTERY
47
IMV
tmM
49
46
VB
72
44
GENERATOR CONTROL UNIT
DRIVE MOTOR CONTROL UNIT
ENGINE CONTROL UNIT
TG*
SOC
TM*
NE*
VEHICLE CONTROL UNIT
51
55
AP
62
BP
61
SP
20
54
ACCELERATOR PEDAL
BRAKE PEDAL
SHIFT POSITION SENSOR
53

FIG. 3

FIG. 4

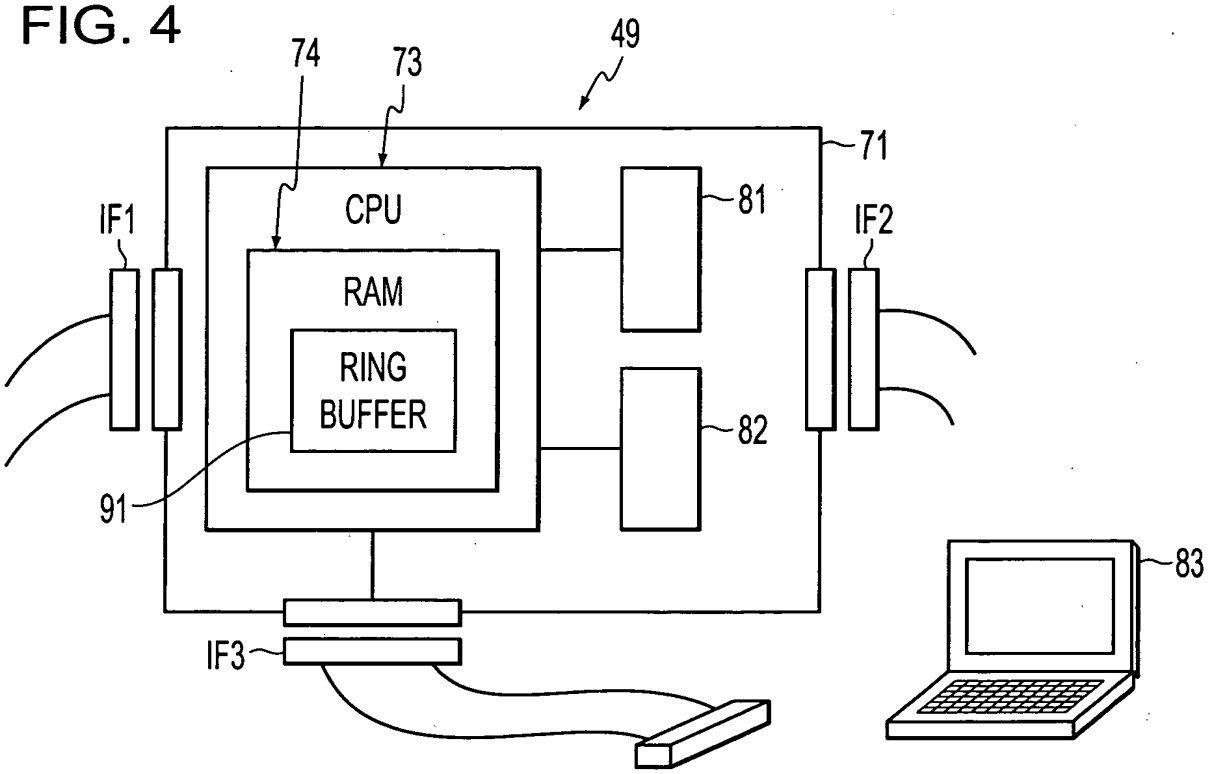

74
73
49
71
CPU
81
IF1
IF2
RAM
RING
BUFFER
82
91
83
IF3

FIG. 5

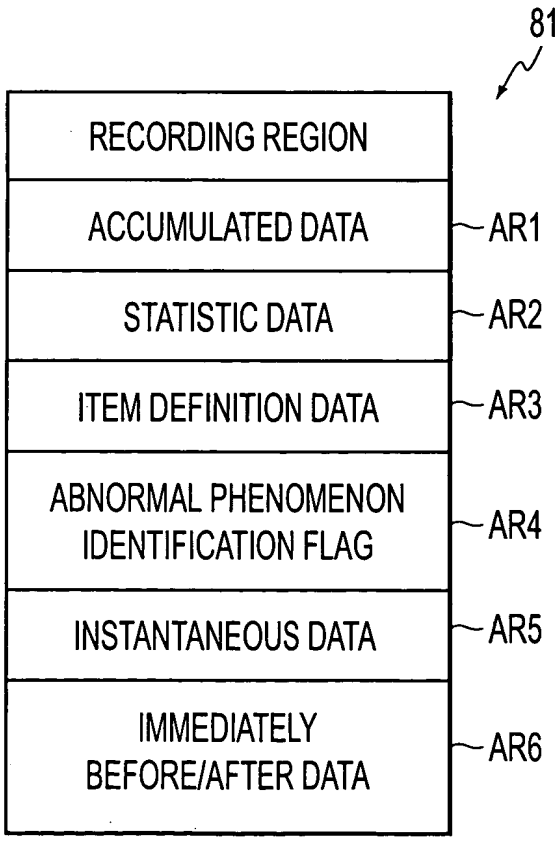

81
RECORDING REGION
ACCUMULATED DATA
AR1
STATISTIC DATA
AR2
ITEM DEFINITION DATA
AR3
ABNORMAL PHENOMENON
IDENTIFICATION FLAG
AR4
INSTANTANEOUS DATA
AR5
IMMEDIATELY
BEFORE/AFTER DATA
AR6

FIG. 6

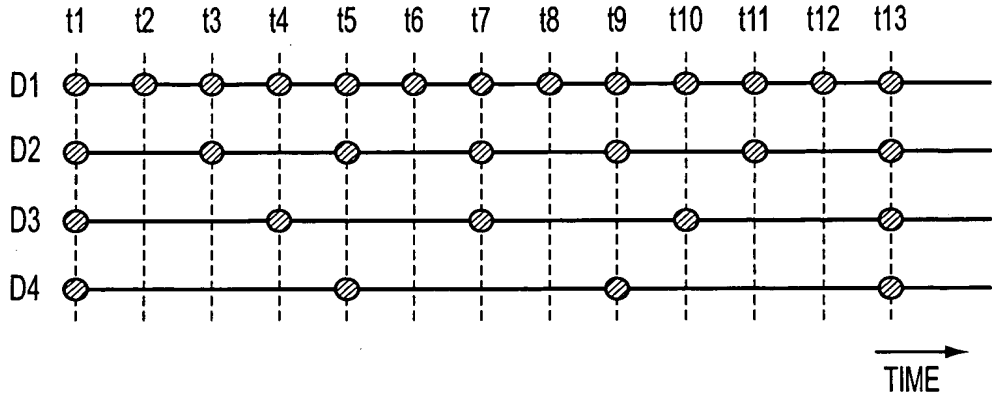
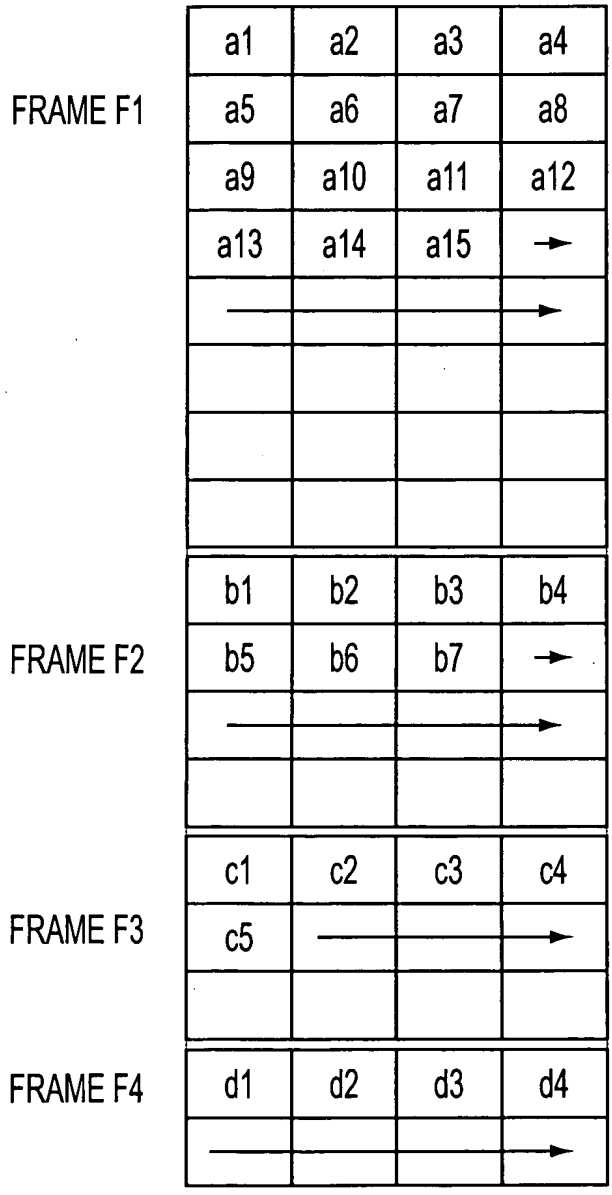

t1
t2
t3
t4
t5
t6
t7
t8
t9
t10
t11
t12
t13
D1
D2
D3
D4
TIME

FIG. 7


FRAME F1
a1
a2
a3
a4
a5
a6
a7
a8
a9
a10
a11
a12
a13
a14
a15
FRAME F2
b1
b2
b3
b4
b5
b6
b7
FRAME F3
c1
c2
c3
c4
c5
FRAME F4
d1
d2
d3
d4

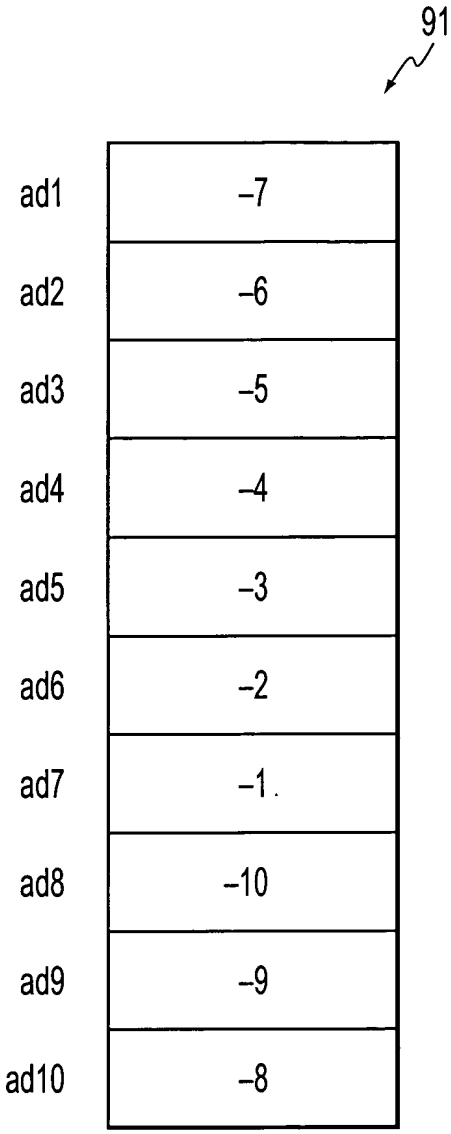


FIG. 8

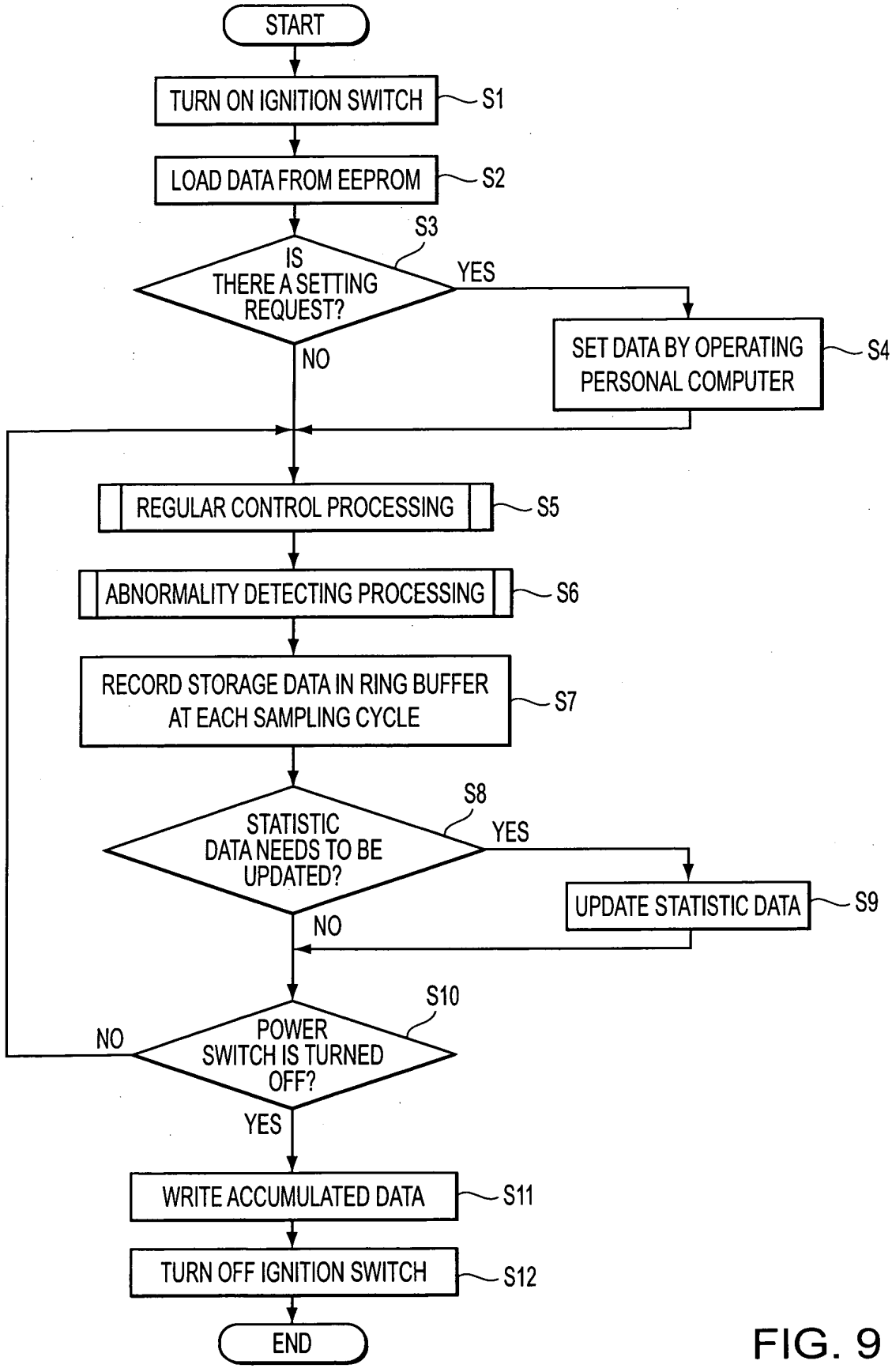

START
TURN ON IGNITION SWITCH
S1
LOAD DATA FROM EEPROM
S2
S3
IS THERE A SETTING REQUEST?
YES
NO
SET DATA BY OPERATING PERSONAL COMPUTER
S4
REGULAR CONTROL PROCESSING
S5
ABNORMALITY DETECTING PROCESSING
S6
RECORD STORAGE DATA IN RING BUFFER AT EACH SAMPLING CYCLE
S7
S8
STATISTIC DATA NEEDS TO BE UPDATED?
YES
NO
UPDATE STATISTIC DATA
S9
S10
POWER SWITCH IS TURNED OFF?
NO
YES
WRITE ACCUMULATED DATA
S11
TURN OFF IGNITION SWITCH
S12
END

FIG. 9

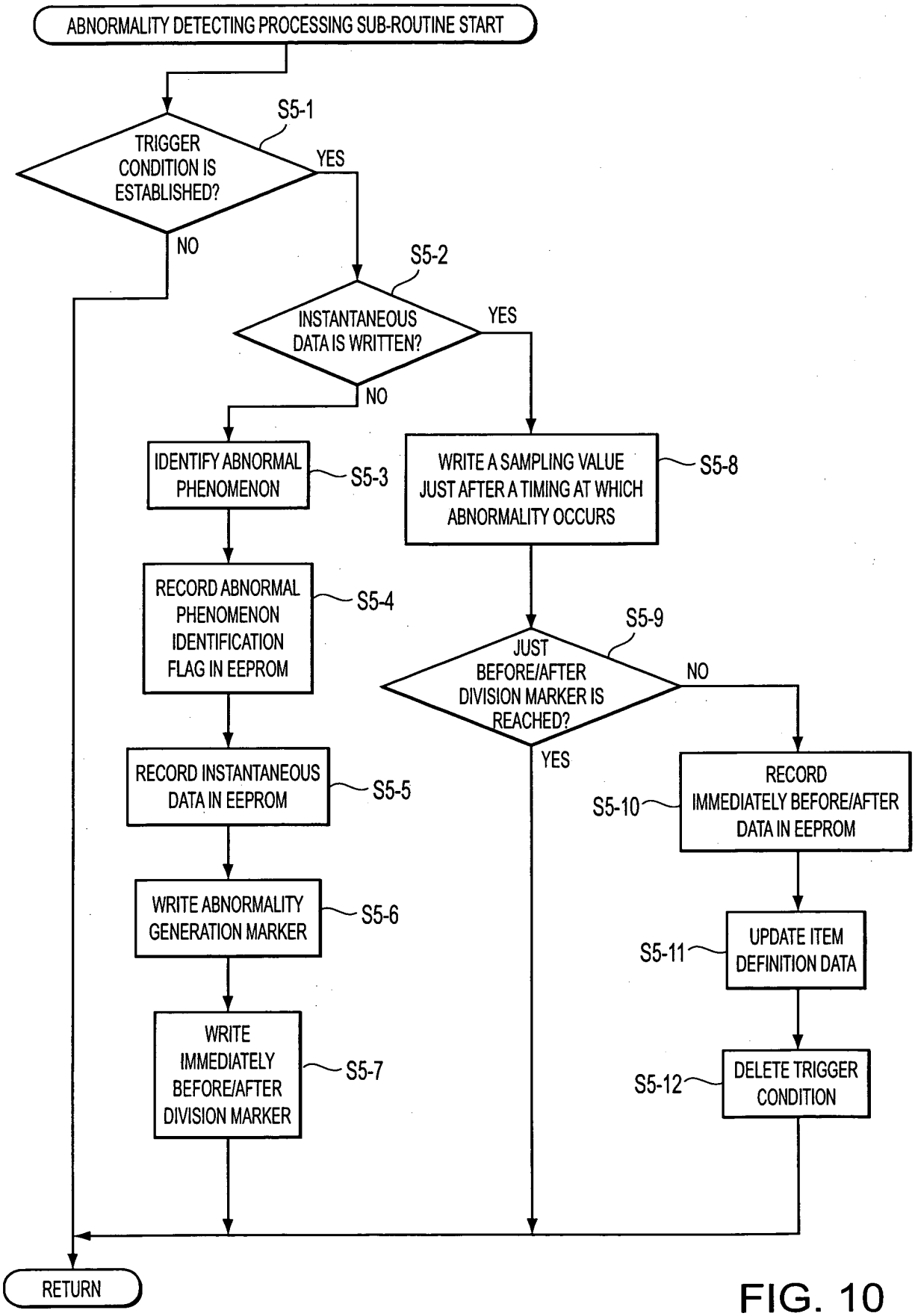

ABNORMALITY DETECTING PROCESSING SUB-ROUTINE START
S5-1
TRIGGER CONDITION IS ESTABLISHED?
YES
NO
S5-2
INSTANTANEOUS DATA IS WRITTEN?
YES
NO
IDENTIFY ABNORMAL PHENOMENON
S5-3
RECORD ABNORMAL PHENOMENON IDENTIFICATION FLAG IN EEPROM
S5-4
RECORD INSTANTANEOUS DATA IN EEPROM
S5-5
WRITE ABNORMALITY GENERATION MARKER
S5-6
WRITE IMMEDIATELY BEFORE/AFTER DIVISION MARKER
S5-7
WRITE A SAMPLING VALUE JUST AFTER A TIMING AT WHICH ABNORMALITY OCCURS
S5-8
S5-9
JUST BEFORE/AFTER DIVISION MARKER IS REACHED?
NO
YES
S5-10
RECORD IMMEDIATELY BEFORE/AFTER DATA IN EEPROM
S5-11
UPDATE ITEM DEFINITION DATA
S5-12
DELETE TRIGGER CONDITION
RETURN

FIG. 10

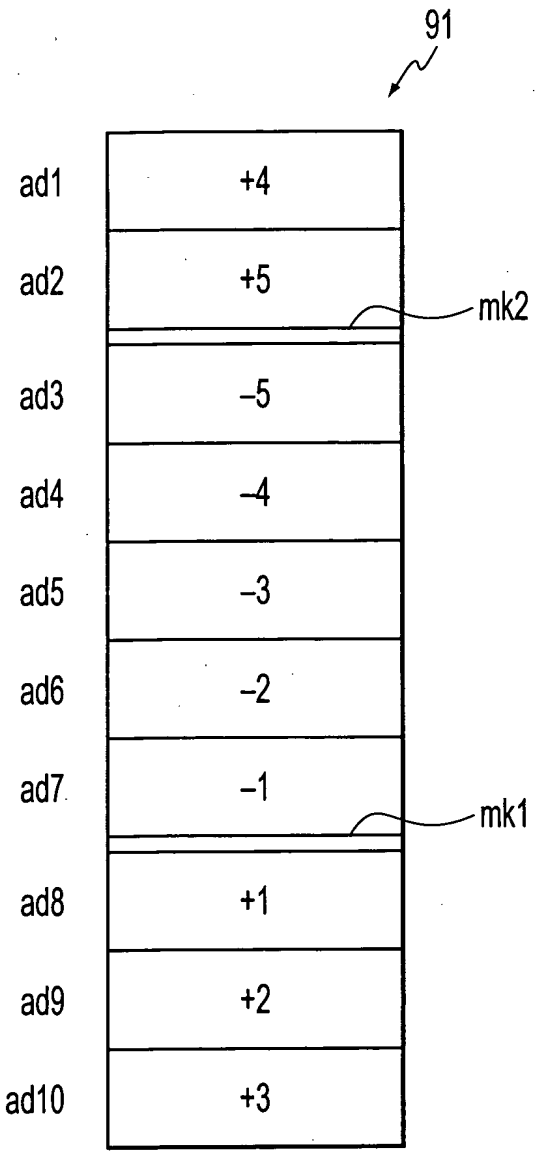

91
ad1
+4
ad2
+5
mk2
ad3
–5
ad4
–4
ad5
–3
ad6
–2
ad7
–1
mk1
ad8
+1
ad9
+2
ad10
+3

FIG. 11

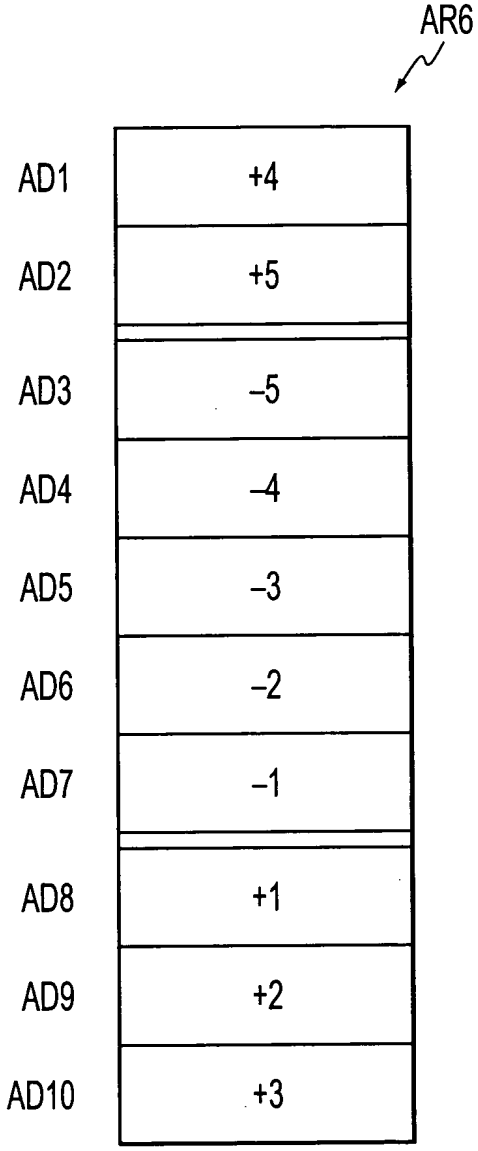

AR6
AD1
+4
AD2
+5
AD3
–5
AD4
–4
AD5
–3
AD6
–2
AD7
–1
AD8
+1
AD9
+2
AD10
+3

FIG. 12